IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Mamoru Yasui, et al.
Serial No.:	10/585,687
Filed:	March 23, 2007
For:	ALIPHATIC POLYESTER RESIN COMPOSITIONS, MOLDED ARTICLES OF ALIPHATIC POLYESTER RESIN AND METHOD OF PRODUCING SAME
Group Art Unit:	1796
Examiner:	G. Mesh
Confirmation No.:	4706
Attorney Docket:	TKMT P135

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Signed: /dn/
Deborah Neill

DECLARATION UNDER 37 CFR § 1.132

Commissioner for Patents
Alexandria, Virginia 22313

Sir:

I, Osaki Tatsuhiko, declare as follows:

1. I am the second-named inventor of the above captioned patent application.

2. I am familiar with the prosecution history of the above captioned patent application, inclusive of the Final Office Action dated September 16, 2010 and the Advisory Action dated November 17, 2010 from the United States Patent and Trademark Office.

3. I reviewed US2005/0027098 (Hayes), cited by the examiner. Hayes describes sulfonated aliphatic-aromatic copolyesters (say, from [0022] to [0026]), but Hayes' aromatic sulfonates (such as a metal salt of lower alkyl ester of 5-sulfoisophthalic acid [0026]) are

components forming sulfonated aliphatic-aromatic copolyesters themselves. In other words, Hayes' aromatic sulfonates are components to be incorporated into the molecules of such copolyesters as constituent units of sulfonated aliphatic-aromatic copolyesters. If aromatic sulfonates such as Hayes' metal salt of lower alkyl ester of 5-sulfoisophthalic acid are incorporated within the molecules of sulfonated aliphatic-aromatic copolyesters as their constituent units as suggested by Hayes, it becomes harder for such copolyesters to crystallize because their crystallization initiating temperature and the crystallization peak temperature are low, and they will tend to become stuck to the mold (because the mold release deformation is large) and to bend (because the deflection temperature under load is low). Consequently, it is not possible from Hayes' sulfonated aliphatic-aromatic copolyesters to obtain molded products with superior physical characteristics under the practical molding conditions of ordinary all-purpose resins, say, without causing deformations at the mold releasing time.

4. In order to demonstrate the statement given above, I carried out demonstrative experiments as follows.

Reference copolyesters, hereinafter referred to as L-4, L-5 and L-6, were initially prepared as follows.

Reference copolyester L-4 was synthesized by obtaining lactic acid oligomer by carrying out a dehydration reaction of 90% L-lactic acid under a reduced-pressure condition of 160°C and 5-20mmHg for 16 hours, and causing 150g of this lactic acid oligomer, 0.15g of 5-sulfoisophthalic acid dimethyl=barium and 0.75g of titanium tetrabutoxide monomer (TBT) to react inside a glass flask of 250ml to react for 6 hours in a nitrogen atmosphere with the reaction temperature maintained at 190°C. After this reaction was completed, phosphoric acid 0.22g (the same molar quantity as TBT) was mixed in and stirred together for one hour. Reaction product (L-4) was obtained by further adding stannous chloride dihydrate 0.83g and p-toluene sulfonic acid 1.0g and polymerizing by maintaining the temperature at 190°C under a reduced-pressure condition of 1mmHg for 17 hours.

Reaction product (L-5) was obtained similarly to reaction product (L-4) described above except that 0.075g of 5-sulfoisophthalic acid dimethyl=barium was used.

Reaction product (L-6) was obtained similarly to reaction product (L-4) described above except that 7.5g of 5-sulfoisophthalic acid dimethyl=barium was used.

Reference copolyesters L-4, L-5 and L-6, thus synthesized, are each Hayes' sulfonated aliphatic-aromatic copolyester and were used respectively as Reference Examples 19, 20 and 21 for evaluations carried out as described in the specification and compared with the results of similar evaluations of Test Examples according to the present invention. The results of these demonstrative experiments are shown below in Tables 1b, 2b and 3b, respectively corresponding to Tables 1, 2 and 3 and using the same symbols used before. For the ease of comparison, Test Examples 1, 6 and 7 for Table 2b and Test Examples 20, 25 and 26 for Table 3b are directly copied respectively from Table 2 and Table 3. It is to be noted that in Tables 1b, 2b and 3b, Test Examples and Reference Examples are distinguishable only in that Test Examples are each characterized as using an aliphatic polyester resin composition containing a nuceating agent in a mixed condition according to the present invention while Reference Examples are characterized as using sulfonated aliphatic-aromatic copolyesters according to Hayes.

Table 1b

Example	Aliphatic polyester resin composition								
	Kind	Aliphatic polyester resin		Nucleating agent for crystallization				Others	
		Kind	Amount (Part)	Salt of Aromatic sulfonate		Other nucleating agents for crystallization		Kind	Amount (Part)
				Kind	Amount (Part)	Kind	Amount (Part)		
Test									
1	P-1	L-1	100	C-1	0.1				
6	P-6	L-1	100	C-1	0.05				
7	P-7	L-1	100	C-1	5				
Reference									
19	R-11	L-4	100						
20	R-12	L-5	100						
21	R-13	L-6	100						

Table 2b

Examples	Kind of aliphatic polyester resin compound	Evaluation			
		Glass transition temperature (°C)	Crystallization-initiating temperature (°C)	Crystallization peak temperature (°C)	Crystallization-terminating temperature (J/g)
Test Examples					
1	P-1	61.5	137.4	130.0	43.8
6	P-6	64.2	133.0	126.5	45.2
7	P-7	61.1	140.5	135.7	41.1
Reference Examples					
19	R-11	60.0	*1	*1	*1
20	R-12	60.1	*1	*1	*1
21	R-13	57.1	*1	*1	*1

Table 3b

Example	Kind of aliphatic polyester resin compound	Molding condition (Temperature (°C)/time(sec))	Evaluation at time of molding	Evaluation of molded articles		
			Mold release deformation	Bending test (Strength (MPa)/ Elastic ratio (MPa))	Deflection temperature under load (°C)	Crystallinity (Absolute (%)/relative (%))
Test 20	P-1	110/40	A	105.2/4358	132.5	48.9/90.5
25	P-6	110/40	A	109.8/4470	130.2	49.0/81.0
26	P-7	110/40	A	108.7/4521	132.1	60.3/97.8
Ref 22	R-11	110/40	C	*2/*2	*2	*2/*2
23	R-12	110/40	C	*2/*2	*2	*2/*2
24	R-13	110/40	C	*2/*2	*2	*2/*2

5. It should be clear by considering Tables 1b-3b that the favorable results obtainable by the use of the kinds of aliphatic polyester resin compositions containing nucleating agent in a mixed condition according to the present invention cannot be attained by the use of the kinds of sulfonated aliphatic-aromatic copolyesters according to Hayes.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both (under Section 1001 of Title 18 of the United States Code), and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Osaki Tatsuhiko
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Jan. 6, 2011
Date